flu near you
do you have it in you?

Kristin Baltrusaitis, MA

Mauricio Santillana, PhD

John Brownstein, PhD

Adam Crawley, MPH

Representativeness of FNY Participants

Representativeness of FNY Participants

- <u>Goal:</u> Compare the FNY population to the US population, quantify the participation biases of FNY, identify under-represented populations and guide recruitment targeting
- <u>Methods:</u>
  - Summarize social and demographic characteristics of FNY participants (users and household members)
    - Gender, age group, and SES (using HDI as proxy)
  - Use chi-square tests and Kolmogorov-Smirnov tests to compare these characteristics to the target population

Flu Season 2014- 2015
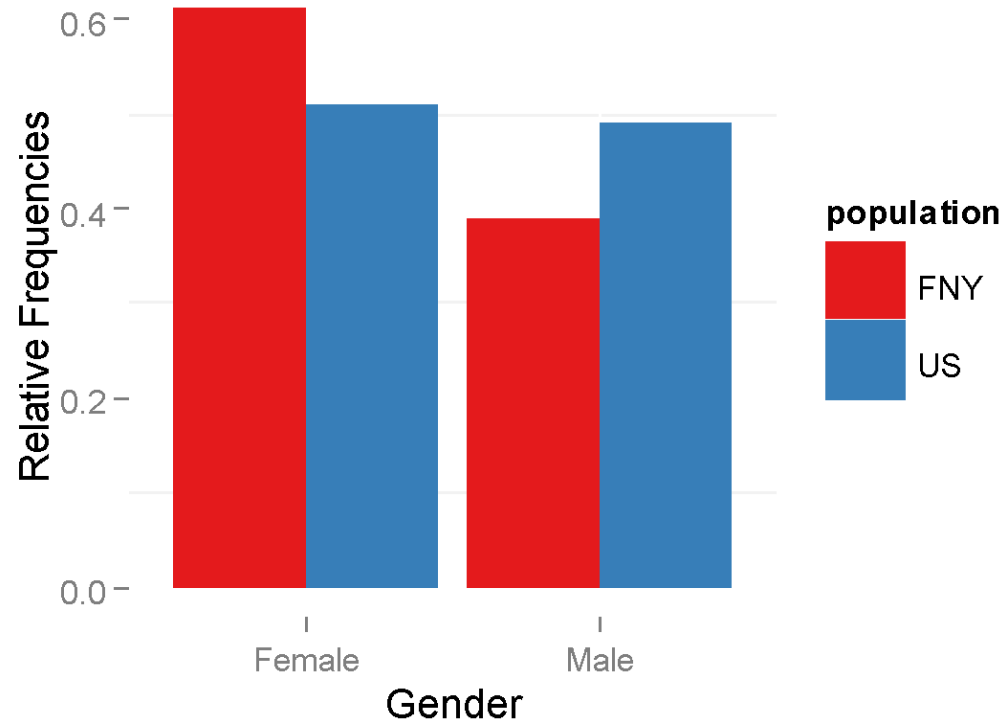
Flu Season 2014-2015

Total number of Participants= 49,814

Gender
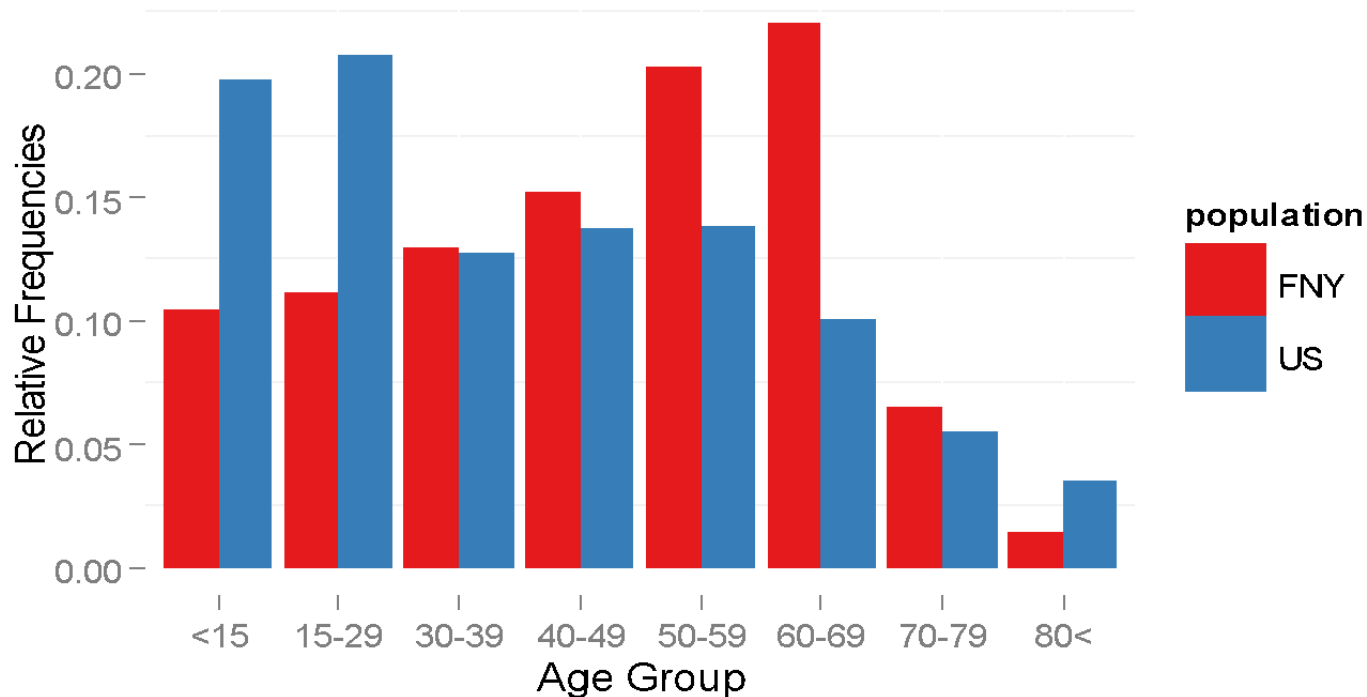

Chi-Square Test:
χ^2 =1946.8, df=1, p<0.00001
* A larger proportion of females participated to the study, with respect to the baseline value

Distribution of Age Groups

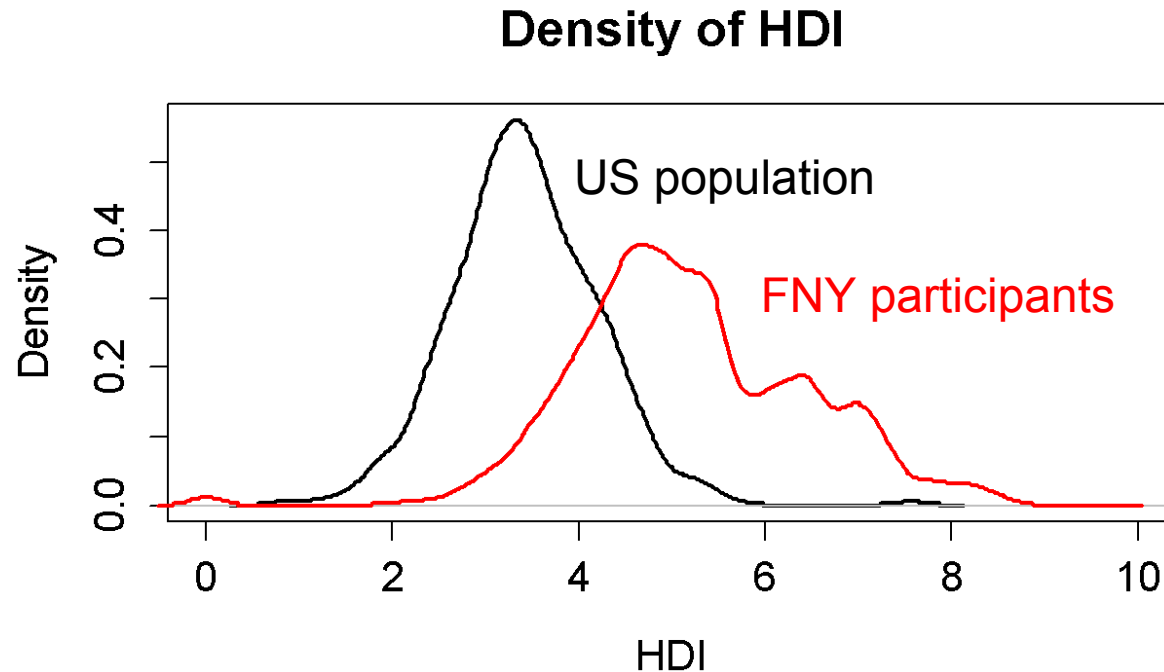Chi-Square Test:
χ^2 =13048.75, df=7, p<0.00001
* All age classes were represented in the sample, however, a significant difference between the repartition in age of active participants and U.S. population is observed

Health Development Index as SES Proxy (by county)

Density of HDI

Two-sample Kolmogorov-Smirnov Test:
D=0.6304 p<0.0001
*The distributions of HDI is significantly different for FNY participants and US population

Social and Demographic Characteristics of Respondent Users

Characteristics of "Good" Users

- <u>Goal:</u> Determine the demographical and behavioral characteristics that are associated with the response rate of FNY participants.
- <u>Methods:</u>
  - <u>User:</u>
    - completed at least one survey 3 weeks prior to the end of flu season
    - between the ages of 13 and 80
    - complete information
  - <u>"Good" user:</u>
    - completed more than 3 surveys
  - <u>Model used:</u>
    - Multivariable logistic regression

Characteristics Assessed

Variable	Description
Gender	Male; Female
Age Group	13-29; 30-39; 40-49; 50-59; 60-69; 70-79
ILI Status at First Survey	Reported ILI as defined by CDC (fever with cough and/or sore throat)[1] at first survey; did not report ILI at first survey
Household Members	Reported for at least one other household member; did not report for other household members
Health Development Index	Continuous Scale 1-10, 1 indicating low SES, 10 indicating high SES

Gender
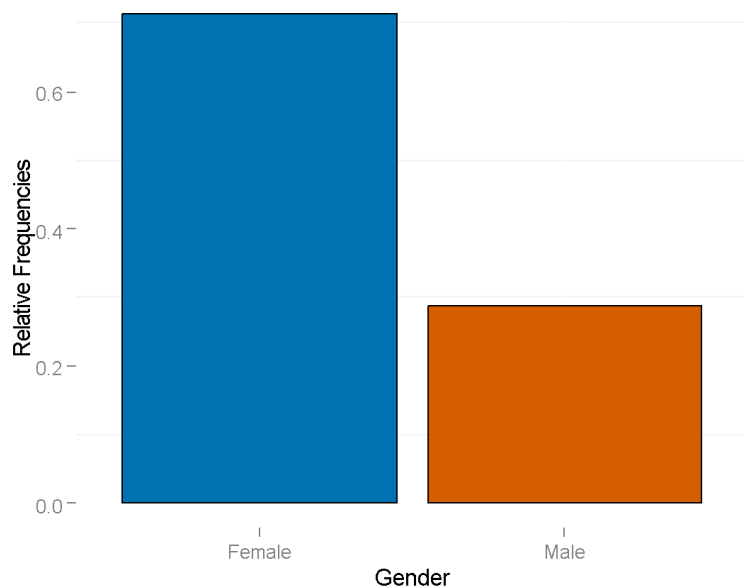
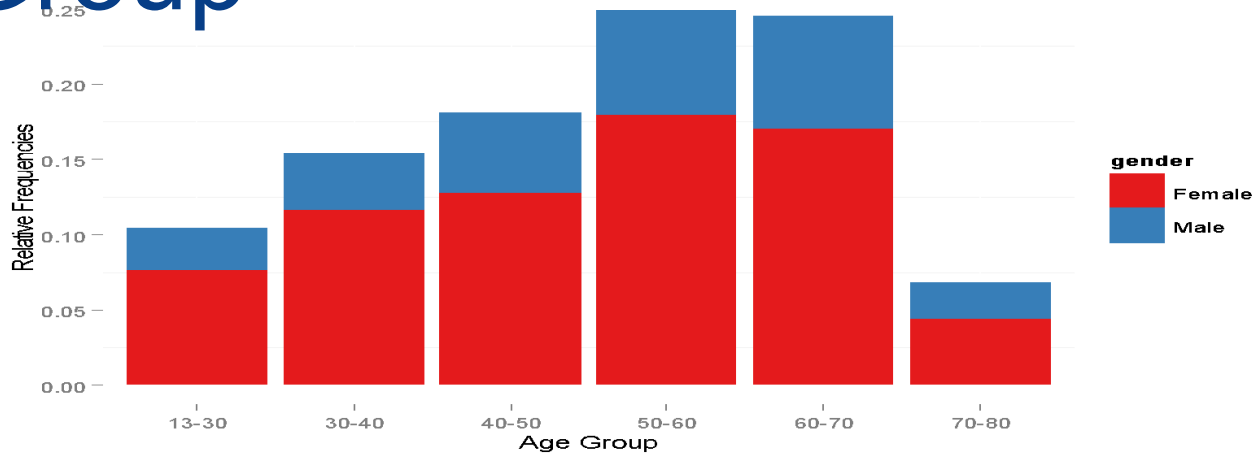**Table 1:** Frequencies of Gender by Follow-up

	Male	**Female**	**Total**
Good	3551 (40.2%)	7320 (33.4%)	10871 (35.4%)
Bad	5272 (59.8%)	14594 (66.6%)	19866 (64.6%)
Total	8823 (28.7%)	21914 (71.3%)	30737

Table 2: ORs of Good Follow-up for Gender by year

Year	OR	LCI	UCI	p
2014-2015	0.75*	0.71	0.79	<0.0001
2013- 2014	1.06	1.00	1.12	0.046
2012- 2013	1.02	0.94	1.11	0.634

*Females are less likely to be good reporters compared to males

Age Group

Table 1: Frequencies of Age Group by Follow-up

	13-30	30-40	40-50	50-60	60-70	70-80
Good	900 (28.2%)	1239 (26.2%)	1767 (31.8%)	2979 (39.0%)	3110 (41.3%)	876 (42.0%)
Bad	2297 (71.8%)	3495 (73.8%)	3785 (68.2%)	4658 (61.0%)	4421 (58.7%)	1210 (58.0%)
Total	3197 (10.4%)	4734 (15.4%)	5552 (18.1%)	7637 (24.8%)	7531 (24.5%)	2086 (6.8%)

Table 2: ORs of Good Follow-up for Age Group

	13-30	30-40	40-50	50-60	60-70	70-80
OR	0.67	0.54	0.70	REF	1.14	1.23
p	<0.0001	<0.0001	<0.0001	REF	0.0001	<0.0001

*Older users are more likely to be better responders than younger users

HDI

Table 1: Descriptive Statistics for HDI

Statistic	Value
Min	0
Median	5.025
Max	9.535
IQR	4.36-6.01

Table 2: OR of Good Follow-up per unit increase in HDI

OR	LCI	UCI	p
1.12*	1.09	1.14	<0.0001

*For each unit increase in HDI the odds of being a good reporter increases

ILI Status at First Entry
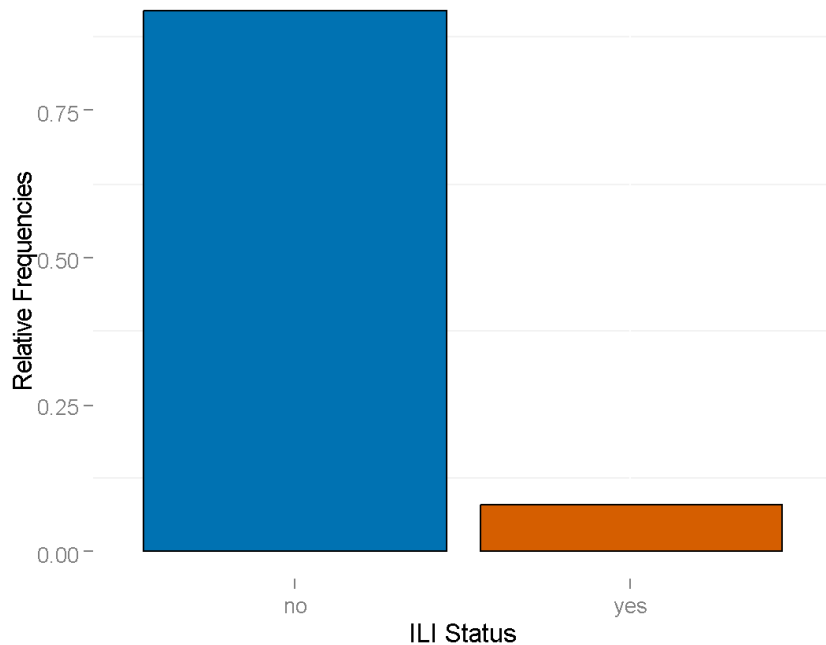
**Table 1:** Frequencies of ILI Status at First Entry by Follow-up

Follow	ILI status	
	Yes	**No**
Good	297 (11.9%)	10574 (37.5%)
Bad	2206 (82.1%)	17660 (62.5%)
Total	2503 (8.14%)	28234 (91.9%)

Table 2: ORs of Good Follow-up for ILI Status at First Entry

Characteristic	OR	LCI	UCI	p
ILI status at first entry	0.22*	0.19	0.25	<0.0001

*Individuals who report ILI at the first entry are less likely to be good reporters compared to those who do not report ILI at first entry

Multiple Household Members
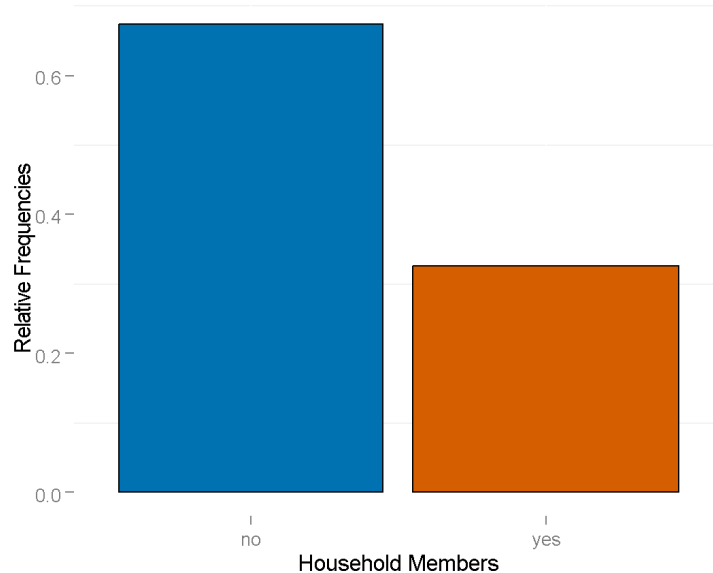
Table 1: Frequencies of Users Who Report for Other Household Members by Follow-up

Follow	Reports for Household Members	
	Yes	**No**
Good	5312 (52.9%)	4734 (22.9%)
Bad	5559 (47.1%)	15132 (77.1%)
Total	10046 (32.7%)	20691 (67.3%)

Table 2: ORs of Good Follow-up for Users Who Report for Other Household Members

Characteristic	OR	LCI	UCI	p
Multiple Household members	3.29*	3.12	3.346	<0.0001

*Individuals who report for other household members are more likely to be good reporters compared to those who do not report for other members

Summary of Results

Variable	OR (p-value)
ILI Status at 1st Survey (yes)	0.22 (<0.0001)
Household Members (yes)	3.29 (<0.0001)
Health Development Index	1.12 (<0.0001)
Gender (Females)	0.75 (<0.0001)
Age Group (70-80)	1.23 (<0.0001)
(60-70)	1.14 (0.0001)
(40-50)	0.70 (<0.0001)
(30-40)	0.54 (<0.0001)
(13-30)	0.67 (<0.0001)

Sensitivity Analysis

Definitions of "Good" User:
>10: More than 10 entries submitted
>03: More than 3 entries submitted
>01: More than 1 entry submitted

Ongoing Projects

Vaccination Assessment

- <u>Goal:</u> Assess vaccination of cohorts over time in order to measure vaccine field effectiveness.
- <u>Methods:</u>
  - Assess vaccine effectiveness by using unadjusted vaccine effective rate equations

Unadjusted Vaccine Effectiveness

- **Vaccine Effectiveness:**

$$VE = 100 \times (1 - Relative\ Risk)$$

$$= 100 \times \left(1 - \frac{ILI\ rate\ in\ vaccinated\ group}{ILI\ rate\ in\ unvaccinated\ group}\right)$$

- 2012-2013:

$$VE = 100 \times \left(1 - \frac{2690/22473}{1703/12743}\right) = 10.4\%$$

- 2013-2014:

$$VE = 100 \times \left(1 - \frac{2010/16533}{1487/9623}\right) = 21.3\%$$

- 2014-2015:

$$VE = 100 \times \left(1 - \frac{4341/27024}{4043/18793}\right) = 25.3\%$$

Vaccine Effectiveness

Year	CDC (overall VE estimate – adjusted*)	FNY (VE estimate - unadjusted)
2012-2013	49% (43% to 55%)	10.4%
2013-2014	51% (43% to 58%)	21.3%
2014-2015	23% (14%– 31%)	25.3%

*Estimates are typically adjusted for study site, age, sex, underlying medical conditions, and days from illness onset to enrollment

FNY used as a predictor for ILI at the regional level

- <u>Goal:</u> Use FNY data to provide real-time information to estimate ILI activity in the US at the regional level